

What is claimed is:

1. A cation-exchanged intercalate that is essentially free of non ion-exchanged intercalated cation comprising :

5

a layered clay material that has essentially all of its exchangeable cations exchanged with one or more organic cations and is substantially free of organic cations that are not ionically bonded to a layered clay platelet.

10

2. The intercalate of claim 1, wherein the cation-exchanged organic cations comprise at least 99.5% of the cation exchange capacity of the layered clay material.

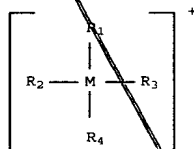
15

3. The intercalate of claim 1, wherein the extractable salts of the organic cations comprise no more than 0.5 molar percent of the cation exchange capacity of the layered clay material.

20

4. The intercalate of claim 1, wherein the organic cation is an onium salt.

5. The intercalate of claim 1, wherein the organic cation has the formula



25 wherein M is either nitrogen or phosphorous, and R₁, R₂, R₃, and R₄ are independently organic and/or oligomeric ligands or may be hydrogen.

6. The intercalate of claim 5, wherein the organic cation is an ammonium salt.

7. The intercalate of claim 1, wherein the cation-exchanged layered clay material is intercalated with an intercalant oligomer or polymer selected from the group consisting of a polyester, polyetherester, polyamide, polyesteramide, polyurethane, polyimide, polyetherimide, polyurea, polyamideimide, polyphenyleneoxide, phenoxy resin, epoxy resin, polyolefin, polyacrylate, polystyrene, polyethylene-co-vinyl alcohol, or a copolymer thereof, or a mixture thereof.

30

Sub 76
cont.

8. The intercalate of claim 7, wherein polymer intercalant comprises a partially aromatic polyamide, aliphatic polyamide, wholly aromatic polyamide or a mixture thereof.

9. The intercalate of claim 7, wherein the polymer intercalant comprises poly(*m*-xylylene adipamide) or a copolymer thereof, isophthalic acid-modified poly(*m*-xylylene adipamide), nylon-6, nylon-6,6, or a copolymer thereof, EVOH or a mixture thereof.

10. The intercalate of claim 1, wherein the layered clay material comprises montmorillonite, hectorite, mica, vermiculite, bentonite, nontronite, beidellite, volkonskoite, saponite, magadite, kenyaite, or a mixture thereof.

11. The intercalate of claim 1, wherein the layered clay material comprises sodium montmorillonite or sodium bentonite.

12. An exfoliate made by delaminating the intercalate of claim 1 such that at least about 50 percent of the layered clay material is dispersed in the form of individual platelet particles and tactoids in a carrier and the individual platelet particles have a thickness of less than about 2 nm and a diameter of from about 10 to about 3000 nm.

13. A process for preparing a cation-exchanged intercalate having a decreased level of extractable cations comprising the step of:

contacting a layered clay material with an organic cation in an amount in the range of 0.95 and 1.05 moles of organic cation for each mole of exchangeable cations in the layered clay material.

14. The process of claim 13, further including the step of intercalating the cation-exchanged layered clay material with an oligomer or polymer intercalant.

SubAI
cont

15. The process of claim 14, wherein the oligomer or polymer intercalant is intercalated into the layered clay material in a batch mixing or a melt compounding extrusion process.

5 16. The process of claim 13 further including the step of shearing the intercalate in a suitable carrier to delaminate the intercalate such that at least about 50 percent of the layered clay material is dispersed in the form of individual platelet particles and tactoids in a carrier and the individual platelet particles have a thickness of less than about 2 nm and a diameter of from about 10 to about 3000 nm.

10 SubAI
cont

17. The process of claim 14 further including the step of shearing the intercalate in a suitable carrier to delaminate the intercalate such that at least about 50 percent of the layered clay material is dispersed in the form of individual platelet particles and tactoids and the individual platelet particles have a thickness of less than about 2 nm and a diameter of from about 10 to about 3000 nm.

15

18. The process of claim 18 wherein the moles of exchangeable cations in the layered clay is determined empirically in order to approximate an equimolar quantity of organic cation to intercalate into the clay by titrating the clay with an organic cationic indicator that cation-exchanges with the exchangeable cations in the clay and provides an indication when all exchangeable cations have been ion-exchanged with cations from the indicator.

19. The process of claim 18, further including the step of extracting any excess cations from the organic cation-contacted layered material to determine by trial and error if an amount of organic cations intercalated into the layered clay material should be raised or lowered from the approximate cation amount determined by titration.